



THE SURFRIDER FOUNDATION, SAN FRANCISCO CHAPTER

The Untold Story Behind the Erosion Mess South of Sloat

The roots of the erosion conflict at south Ocean Beach, San Francisco

Bill McLaughlin

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updated





Ocean Beach South of Sloat Blvd. The Aftermath of the 2010 El Niño (Photo B. McLaughlin)

As another El Niño winter begins to set in, meteorologists have been telling us for months to prepare for heavy erosion and storm damage along our coastlines. Here in San Francisco, we have a poster child of sorts for this phenomenon: the Great Highway Extension south of Sloat Boulevard. Ever since the mid 1990's, this area has been ground zero for erosion related damage in our city. During the 1997/98 El Niño, waves ripped apart one of the Sloat parking lots. In 2010, a piece of the Great Highway near Skyline Boulevard fell into the surf. Every winter massive waves claw away at the artificial bluff that supports the road. Over the years, San Francisco Department of Public Works has had to declare 3 emergencies to protect the infrastructure. A boulder seawall is hastily erected which temporarily saves the road. Down on the beach, a mess of boulders and construction debris is left to litter the shoreline.

A long term plan to address Sloat erosion is finally being embraced by the City. It is found in the Ocean Beach Master Plan (OBMP), a joint government/public effort to improve management of Ocean Beach. To solve the erosion challenge at Sloat, the OBMP calls for the road to be relocated while wastewater infrastructure is to be protected. This way, the beach may be cleaned up and restored.

Since its release in 2012, the Ocean Beach Master Plan has received much praise and publicity for this innovative approach to coastal erosion. Last year President Obama's environmental policy advisor Michael Boots visited the area to survey the erosion hotspot. He showered praise on the OBMP, saying that it serves as a national model for sea level rise and climate change adaptation.

For those of us working to see a long term plan implemented for Sloat erosion, this is all great news. However, there is one very important piece of the Sloat erosion story that has gone unreported thus far:

Back in the 1970's, when the Great Highway and the westside neighborhood sewer system was about to undergo a joint renovation, the City was warned not to locate the infrastructure so close to the surf at Ocean Beach.¹ Erosion and storm surf were widely predicted to threaten both the road and the wastewater lines. The issue was so serious that the City was almost denied the permit to build the

combined renovation project because of the erosion threat. In the end, the City prevailed, but only after fighting an epic battle that included warnings from a panel of coastal engineers, outrage from concerned citizens, opposition from neighborhood groups, wrangling with the GGNRA, and strict conditions from the California Coastal Commission.

This is the Untold Story behind the Erosion Mess South of Sloat

The story begins with the environmental laws passed in the late 1960's to early 1970's. The National Clean Water Act (1972) was landmark federal regulation that put in place new water quality standards for our oceans and bays. Around the same time, California had just created its own network of agencies to advance clean water policies: the state Water Resources Quality Control Board and nine Regional Water Quality Control Boards (RWQCBs). One of the early actions of the RWQCBs was to force coastal cities with poor water quality - like San Francisco – to install major upgrades to their sewage treatment systems.

At the time, San Francisco had very poor water quality surrounding its shoreline because of a sewage overflow problem. The problem lies in the fact that our sewer system is “combined” which means plumbing waste shares the same pipeline that catches street runoff during storms. When there is a major rainfall event the sewers used to - and occasionally still do - fill up to the point in which they get overloaded with storm run-off. Because the city's sewage treatment plants can only process and clean so much effluent at a time, excess wastewater is discharged directly into our bay, ocean and onto our city beaches. Before the upgrades mandated by the Regional Water Quality Control Board, San Francisco's sewer system would overflow anywhere from eighty to a hundred plus times per year.

Because of its poor water quality, San Francisco came under intense pressure from the new Regional Water Quality Control Board² to address this situation. The City responded by establishing the Clean Water Program - a massive sewer upgrade project for the entire city. The Clean Water Program built a network of large concrete boxes to capture, store and transport the storm water and sewage mix.

Known as wastewater transport boxes, these conduits live under city streets that line the perimeter of town. Nowadays, most of the excess combined effluent is temporarily held in the boxes until after the storm event; and then slowly fed back into our city's wastewater plants. Storm water discharge events were eventually reduced to an average of only 8 events per year. Undoubtedly, the Clean Water Program provided a major boost to our ocean and bay's water quality.

In the early months of 1977, the City began to fix a location to build the transport box for the west side neighborhoods of the Sunset and Richmond Districts. The initial plan was to place the structure underneath 42nd Ave. In that location, gravity could be used to bring the neighborhood's wastewater to the new Oceanside Treatment Plant, to be built next to the SF Zoo. However, local residents of 42nd Avenue mounted vigorous protests at city planning meetings. People objected to traffic tie-ups, construction noise and the impact to their home's real estate values. The protests were unusually effective. Within a few short months, the 42nd Ave location was abandoned.

¹ See 1978 Memorandum North Central Regional Commission *Findings of Denial for Permit Application #137-77& #128*

-78, *City and County of San Francisco*, p.2.

² Because of delays on implementing a sewer upgrade, the board had placed a building moratorium on the City. See Statement by Roger B. James, Assistant Executive Officer California Regional Water Quality Control Board, San Francisco Bay Region to California Coastal Commission June 5, 1979.

Project planners instead switched their sights to the upper Great Highway. The road, originally built during the 1920's, was about to undergo a major renovation. Plans were already moving forward to

demolish the six -lane road and replace it with an upgraded design. Clean Water Program officials saw an opportunity to place the western section of the sewage transport box under the refurbished road. Federal and state grant money would be available to fund over 87% of the work³. At a city planning commission hearing, it was noted that the Ocean Beach location, unlike 42nd Ave, would also impact fewer residents.

However, during the planning period for the new location of the sewer project, major objections once again came from local residents. This time, the community did not just complain about issues of noise and property values. Instead, people were concerned about having a sewer tunnel on the beach and what affect that may have. One Great Highway resident and retired engineer from the United States Geological Survey, Dr. George Gates, warned that wave damage to the proposed transport box was inevitable, which could cause a massive sewage spill on the beach. Residents were also worried about the beach eroding away. Neighborhood groups such as the Outer Sunset Coalition urged the City to look into putting the transport box underneath Sunset Boulevard instead.

Also greatly alarmed by the Great Highway proposal was the National Park Service (NPS), which at the time had recently acquired management duties for Ocean Beach, incorporating it into the Golden Gate National Recreation Area (GGNRA). In response to the looming sewer project, NPS convened an Ocean Beach Erosion Conference. Held at Fort Mason in July 1978, a panel of 30 coastal engineers and experts gathered to examine beach dynamics and erosion along the San Francisco coast. The group also weighed in on the City's proposed sewer transport box.

Several key facts emerged from the conference, perhaps the most significant one being that most of the beach was undergoing a process of long term, continual erosion This was because the natural shoreline of Ocean Beach was pushed 200 feet seaward in order to build the Great Highway for automobiles.⁴ South Ocean Beach, near the Sloat Boulevard area, had been extended even more. Experts predicted steady erosion could be expected to continue until the shoreline regained equilibrium with its original position before the road was built.⁵

When conference leaders evaluated the proposal for constructing the sewage transport box under the Great Highway, red flags were raised. Most agreed with Dr. Gates' view that the infrastructure would eventually come under assault by the pounding surf during its 100-year lifespan. One prominent engineer consulting with the City, Dr. Richard Ecker, predicted the transport box would be under threat in less than 20 years, possibly sooner⁶. South Ocean Beach drew particular concern. That section of the road already had multiple episodes of storm damage since it was paved in 1928. From Rivera Street to Fort Funston bluffs, construction debris and even old tombstones were dumped on the beach to protect the road.

³ This was significant as the total cost of the combined road and sewer renovation turned out to be \$1.5 Billion. See "Sewer project rejection stuns city officials" (September 8, 1978) SF Examiner, p. 4.

⁴ See Battalio, Bob, Physical Processes at Ocean Beach San Francisco p. 13

⁵ The first official shoreline survey of Ocean Beach was performed in 1852 by the US Geodetic Survey (now the National Geodetic Survey). Much of the shoreline at south Ocean Beach originally reached the lower Great Highway. See Olmsted, R.O. (1979) *Ocean Beach Study: A survey of Historical Maps and Photographs*. San Francisco: San Francisco Wastewater Management Program

The message from the NPS erosion conference was clear: unless designs were put in place to protect the transport box, damage to the infrastructure was highly likely. Furthermore, experts predicted that even if the transport boxes were protected, the beach would be in danger of eroding away. This would be due to the effect of wave contact with the transport structure: As waves bounce off the concrete box, sand would be scoured away. With such a process in place, erosion tends to become self-propagating, dropping the elevation of the shoreline until the beach becomes submerged.

Despite the ominous warnings from the scientific community as well as protests from the neighborhood and community groups, the City pressed on with the Great Highway location. Whatever threats the surf might bring to the new infrastructure, city engineers were confident there would be a solution. One way the City offered to mitigate the erosion threat was to expand the beach using excavated sand from the project. To manage future erosion, Clean Water Program officials suggested an agreement should be made with the National Park Service and the Army Corps of engineers to perform beach replenishment when needed.⁷

All seemed to be on track for building the project until it was time for the city to get a permit from the California Coastal Commission.

Then, the project hit a wall.

In 1978, the Coastal Commission was a new state agency charged with the protection of California's shorelines and beaches. A critical power given to the agency was to issue permits for any new coastal development – private or public. This brought San Francisco's Clean Water Program at Ocean Beach under their review. The Coastal Commission's North Central Coast branch was tasked to review the permit for the road and sewer transport project.

The Coastal Commission was well aware of the GGNRA's Ocean Beach Erosion Conference and its findings. Local staff had agreed with the conference findings that beach erosion and infrastructure safety were serious and valid concerns. Staff worked with the City on a new design that would re-align the combined project a bit more inland than originally proposed.

By September 1978, the regional Coastal Commission officially was ready to consider approving the Clean Water Program permit. After looking at the extensive public comment as well as the findings from the NPS erosion conference, the commissioners unanimously rejected the City's permit application.

⁶ See Ecker, R.M. *Ocean Beach Sand Replenishment Program* (1980) p71

⁷ The original permit application submitted by the City did not specify which agency would be responsible for sand replenishment. Local staff insisted that such an agency be identified and an agreement be worked out before construction. See California Coastal Commission *Initial Summary Report and Staff Recommendations* Application Numbers 137-77 and 128-78 (1978) pp. 11-12. Additionally, in the City's Beach Nourishment Program approved by the California Coastal Commission in 1986, CWP Executive Director Todd Cockburn asserted that during the planning phase of the transport project, the City had been assured that the GGNRA would "...undertake a sand replenishment program to deal with beach erosion caused by natural forces." While the GGNRA was willing to aid in any such effort, their view was that the City should be chiefly responsible for securing the funds. See GGNRA General Superintendent Brian O'Neill's Statement for the California Coastal Commission Hearing Wednesday September 10, 1988

The main reason the permit was rejected was the threat of beach loss due to erosion. However, the proposed project was judged to violate coastal act law in many different ways. One key point cited by commissioners was that approving the project would lead to the inevitable need for hard shoreline protection – seawalls or rock revetments. In explaining their no vote, the Regional Commission ominously pointed out the pitfalls inherent in the project area south of Sloat, an area known to be prone to erosion.⁸

The permit rejection shocked San Francisco's public officials. A lot of state and federal financing was on the line for the high profile project. Additionally, the Regional Water Quality Control Board was ready to place hefty fines on the City if there were any more construction delays. In a widely publicized maneuver, Supervisors Diane Feinstein, John Molinari, and Louise Renne were dispatched to the state capitol to try to overturn the North Central Coastal Commission's decision.

Unfortunately, they were successful. After meeting behind closed doors with officials at the capitol, the state level office of the Coastal Commission took over jurisdiction of San Francisco's Clean Water Program permit. The regional district office was in effect ordered to rescind its vote as well as to work out a compromise with the City.

In June 1979 that compromise agreement was reached. Despite vociferous public opposition, the Clean Water project would be approved, but with a list of very strict conditions.

The most significant condition was a requirement for the City to fund and execute beach replenishment throughout the life of the infrastructure. Replenishment was to be done on an "as needed" basis. This was defined to mean that whenever the mean high tide line approached within fifty feet of the road and transport box, sand replenishment was to occur. To facilitate this condition, pole markers were placed into the beach, fifty feet west from the base of the road. When the markers became exposed due to erosion, replenishment was supposed to occur. The Commission was adamant that the beach needed to be preserved for both for the sake of public recreation and to safeguard the new infrastructure.

In order to ensure that sand replenishment would be adequately funded, the Commission also mandated that the city put aside \$10 million in a special account exclusively to fund beach nourishment (special condition #9)⁹. The amount was required because, according to coastal engineers, beach replenishment was going to be needed repeatedly throughout the 100 year life of the wastewater project.¹⁰

⁸ See Letter from Robert Brown, Executive Director North Central Regional Commission to North Central Coast Regional Commissioners, October 13, 1978 Subject: *Findings of Denial for Permit Application #137-77 & #128-78, City and County of San Francisco page 5.*

⁹ See Letter from Michael L. Fischer Executive Director, California Coastal Commission (Letter to State and Regional Commissioners, Interested Public) June 13, 1979, P.21.

¹⁰ With \$10 million, the Commission decided the City would be able to provide 100,000 cubic yards of sand on a yearly basis. See Champion, D. "S.F. to Save on Beach", SF Chronicle, June 8, 1981, p. 22.

Michael L. Fischer, Executive Director of the California Coastal Commission summed up the agency's thoughts on the beach replenishment conditions quite clearly. In a letter dated May 25, 1979 he states:

"A sandy recreational beach is the quintessential coastal resource. Its protection is among the highest priorities of the coastal act. Locating the Transport on the dynamic shoreline at Ocean Beach requires the most conservative and prudent measures to preserve a usable shoreline. The probability of the structure's exacerbating the documented erosion of the beach has been verified by the preponderance of scientific evidence. However, the extent, the degree, and the chronology of this process remain the subject of legitimate debate among experts. Such uncertainty can be expected as long as the result of this Commission's action is not a shoreline bereft of sand."

In the aftermath of the project's approval, the city government spent the entire 1980's both building the huge project, while simultaneously fighting to undo the beach replenishment condition in the permit. Local officials essentially felt open ended replenishment was unfair and unworkable due to cost. The City particularly chafed at the idea of being held responsible for funding the work. The argument was that if there was to be any large-scale beach replenishment efforts, other federal and state agencies should share in the responsibility. In the words of Clean Water Program Executive Director Todd Cockburn: "Neither the Westside Transport, the Great Highway, nor the concrete seawall will cause erosion at Ocean Beach. Erosion at Ocean Beach is complex natural oceanographic phenomenon. San Francisco cannot reasonably be held solely responsible for artificial nourishment."¹¹

By 1988, the City secured a series of amendments to the original Coastal Commission permit. The requirement for beach replenishment was eventually watered down. By the time the project was finished, the City was only required to "lead a cooperative agreement" with the Army Corps of Engineers, the Park Service, and other state agencies to do beach replenishment. The 1979 sand replenishment fund of \$10 million was reduced to \$625,000 (which was eventually spent on studies). All this occurred despite a storm of protests from the GGNRA and the local community.¹²

South of Sloat

In 1991, the Clean Water Project unveiled its plans to build the last piece of the Great Highway /sewer transport box system, the Lake Merced Transport. For some reason, neither in SF Planning Department documents nor in the Coastal Commission permit does the erosion threat appear on the radar.¹³ This was a bit perplexing, since the south of Sloat Great Highway Extension was under attack from the surf ever since it was built in 1964.¹⁴ In fact, the North Central Coastal Commission had already fought with the City in 1973 over the dumping of construction debris on the beach at this location. What was particularly troubling was that the road/box were not required to be aligned more landward, in a straightened alignment with the rest of the infrastructure. Instead, the south of Sloat Great Highway and Lake Merced Transport were built with a curved shape, punctuated by a large bend leading out toward the surf near the Sloat Boulevard intersection. It was this section of road that would spark the first erosion emergency.

¹¹ See Testimony by Robert Todd Cockburn, Executive Director Clean Water Program to the California Coastal Commission, September 10, 1986.

¹² See City and County of San Francisco *Beach Nourishment Program* (1986), page 7. Also, see statement from Brian O'Neil, superintendent of the GGNRA, to the Coastal Commission Hearing September 10, 1986.

¹⁴ See Champion, D. (1973, June 5) Ocean Beach Furor S.F. Chronicle p.2

By 1993, the Clean Water Project for the city's west side was complete: the, Westside Pump Station, and Oceanside Treatment Plant were located on the landward side of the road south of Sloat. The Lake Merced Tunnel was placed closest to the ocean, underneath the southbound lane. A full network of sewage storage now lay underneath the entire length of the Great Highway. Landscaped sand dunes were built along most of the beach to shield the infrastructure as well as to control blowing sand. Beneath those landscaped dunes is a mass of concrete debris and rubble, placed by the City to shield the transport system from future storm surf.

Conclusion:

Without a doubt, from a water quality perspective, it is accurate to say the Clean Water Project was a success. Combined sewer overflows per year were drastically reduced to the single digits, as was promised. However, just two years after the project's completion, in 1995, the south of Sloat section of came under attack from the sea. First to erode away were the landscaped dunes in front of the north parking lot. They were gone by the end of 1996.



On the left is the north Sloat parking lot, circa 1993 post construction. On the right is the same parking lot 4 years later, during the 1997 El Niño. (photo courtesy of Bob Battalio, P.E., Phillip Williams and Associates)

During the peak El Niño winter of 1997/1998, erosion destroyed most of the seaward parking in the north parking lot. Waves also began crashing up against the base of the road, threatening the Lake Merced Transport line. This was when the City declared its first erosion emergency for the combined infrastructure. A series of 3 rock revetment projects would eventually be installed on the beach.

Nowadays, waves routinely bounce against the base of the road and parking lots, scouring away sand and endangering the road and the Lake Merced Tunnel. Meanwhile, the south of Sloat shoreline looks more like a bombed-out city. There is little left of the beach. Most of the shoreline is now underwater except during the lowest tides. The Coastal Commission permit requirement to maintain the dunes through replenishment was never effectively carried out.

Due to public outcry over the 1990s' rock revetments and their effect on the beach, the City did construct a pair of modest sand dunes south of Sloat. However, those dunes were small and installed in a piecemeal fashion. The limited dunes placed by the City washed away within a few short years. In violation of the Coastal Commission agreement, the emergency rock revetments were never removed.

Meanwhile, the Army Corps of Engineers has tried to rebuild the beach. That agency has been running a "pilot" project that consists of dumping sand dredged from the shipping channel into the surf zone at Sloat. The hope is that the sand will wash ashore and rebuild the beach. Unfortunately, this effort has also been unsuccessful.

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Afterword

Looking at the big picture that the historical record provides, the erosion conflict at Sloat has its roots in the history of the Great Highway itself.¹⁵ Ever since it was carved out of the sand dunes, the Great Highway has been under attack from the sea. The truth is the tidal zone at Ocean Beach is extremely dynamic, and constantly in flux. Development in the coastal zone here needs proper setback to allow for this reality. The road and sewer renovation project was a golden opportunity to address the issue. Unfortunately, by placing the wastewater infrastructure underneath the road - especially south of Sloat - the City wound up exacerbating the erosion conflict.

The projected life of the Clean Water project transport system is 100 years. We are almost at the end of the first quarter. Luckily, most of Ocean Beach and the infrastructure appear to be safe.¹⁵

However, we are now entering an age of climate change driven storm activity and a spike in sea level rise. How will the Ocean Beach fare during the next several decades? Will we accept science, and try to preserve Ocean Beach in the way that makes sense – by planning for long term-managed retreat of development? Or we will choose to replicate the mistakes of other coastal governments by protecting shoreline development at the expense of the beach? Then, fall in the trap of relying on costly, open ended sand replenishment.

¹⁵ See A History of Erosion at Ocean Beach by the author of this report

Special Note:

Between 1993 and today, there have been three citizen / government task force groups assigned to finding a solution to south Sloat erosion. There have also been numerous resolutions from the Board of Supervisors, scores of studies done both by the City, the US Geological Survey, as well as the Army Corps of Engineers. There have also been multiple sand back-passing projects and not to mention plenty of taxpayer money spent on this issue. The Ocean Beach Master Plan has made the most substantial progress toward implementing a solution. In that regard, we wish to thank SPUR's Ocean Beach Master Plan project manager, Benjamin Grant. He especially has put in a tremendous amount of work into this project and is garnering results. Moving forward, we hope to see the City and permitting agencies enforce firm deadlines for the implementation of a long-term plan for Sloat.

The Surfrider Foundation released this report because the history behind the road and wastewater transport has been forgotten. Ever since the south of Sloat area became an erosion hotspot, there has been no mention of the original Clean Water Program history, the great erosion debate, the warnings from coastal engineers, the Coastal Commission's reluctant approval, and especially the approved permit requirements.¹⁶ This includes the current Ocean Beach Master Plan phase. According to our research, the last public document that clearly acknowledges the history of the Coastal Commission's requirement for beach replenishment dates back to 1992¹⁷. This is unfortunate because a lot of time, personal energy and taxpayer money were spent in the mid 1970s and 1980s to address this issue. The intent was to avoid this very scenario we find ourselves in at Sloat. With this history now in the open, and able to serve as our guide, we hope to see the erosion challenge at south Ocean Beach finally resolved.

¹⁵ Sometime between 2050-2100, the predictions are fairly grim. Most the beach between Ortega and Rivera is predicted to disappear, with waves lapping against the seawall. See the Ocean Beach Master Plan, pp 59-61. Interestingly, over the last 20 years, north Ocean Beach has actually been accreting or growing in width.

¹⁶ For example, in 2005, SFDPW released its Ocean Beach Great Highway Storm Damage Protection Report. The report covers the extensive damage from the 1990's erosion emergencies as well as what to do in response. There is no direct mention of the Coastal Commission Clean Water Program permit conditions requiring sand replenishment to control erosion. In 2012 and in 2014, two sand back-passing projects were conducted by the City. Once again, there is no evidence in official documents linking the projects to the Coastal Commission permit history.

¹⁷ See letter from Peter Douglas, Executive Director of the Coastal Commission to Coastal Commissioners, Interested Persons re: "Status on Implementation of the Beach Nourishment Plan, Ocean Beach City and County of San Francisco" (for the Commission Meeting of August 14, 1992), August 18, 1992.

Thanks...

Although this battle was fought 30 years ago, we would like to single out and thank all of the people who stood up for Ocean Beach during the 1970's Clean Water planning and Coastal Commission meetings. This is a very large group that includes engineers, public officials, scores of citizens and a stable of local neighborhood organizations. A short list includes: Dr. George Gates, the retired USGS engineer and Great Highway resident who was one of the first voices from the science community to highlight the erosion danger to the proposed Clean Water project; Amy Meyer and Edgar Wayburn of the People for the GGNRA, environmental activists who spent many years fighting for the preservation of our local coastlines; Judy McCabe and Dennis Antenore of the Sunset Coalition, who along with many other neighborhood activists mounted a vigorous opposition to the project at public hearings; J Michael Wornum and the 1978 North Central District office of the Coastal Commission, who rejected the City's original Clean Water permit; the National Park Service for holding the Ocean Beach erosion conference in 1978; and Brian O'Neill, the former superintendent of the Golden Gate National Recreation Area for his vigorous opposition to the City's attempt to reduce its sand nourishment funding obligations.

References:

The newspaper articles listed below provide an excellent accounting of this story. Agency reports, letters and other citations listed below can be found in the California Coastal Commission's files for the San Francisco Clean Water Program Public Works Project. A few other documents can be found online such as the Army Corps of Engineers study, SPUR's Ocean Beach Master Plan and the author's report on the History of Coastal Erosion at Ocean Beach.

Newspaper Articles

Ocean Beach's case against big sewer plan (1977, June 22) S.F. Examiner p. 4
Cone, R. (1977, September 3) Grand new beach for Great Highway S.F. Examiner p. 3
Sewer project rejection stuns city officials (1978, September 8) SF Examiner p. 4
Cone, R. (1979, June 6) Sewer plan clears big hurdle S.F. Examiner p.37
Borsuk, D. (1979, June 8) Westside sewage project approved S.F. Progress p.4
Champion, D. (1973, June 5) Ocean Beach Furor S.F. Chronicle p.2
Champion, D. (1979, June 7) Ocean Beach Sewer Project Approved S.F. Chronicle p. 2
Champion, D. (1981, June 8) S.F. to Save on Beach SF Chronicle June 8, 1981 p. 22
Champion, D. (1986, September 11) Coastal Panel Puts Roadblock n S.F.'s Great Highway Plan S.F. Chronicle p.2
Champion, D. (1988, February 29) Great Highway is Taking Shape S.F. Chronicle p.A2
Champion, D. (1988, July 9) Holding Back the Sea at Ocean Beach S.F. Chronicle p. A2
Burdman, P. (1992, December 10) City considers creating dunes to protect stretches of the Great Highway S.F. Chronicle p A22
Adams, G. D. (1993, June 13) New sea wall shields highway from sand S.F. Examiner pp. B1-B3
Levering, Robert (1978, September 21) Suddenly Feinstein, Kopp, and Gonzales discover the Coastal Commission. Why? P. 3

Public Documents:

Letter from Robert Brown, Executive Director North Central Regional Commission to North Central Coast Regional Commissioners Subject: *Findings of Denial for Permit Application #137-77 & #128-78, City and County of San Francisco*, October 13, 1978

Army Corps of Engineers *Ocean Beach Storm Damage Reduction Reconnaissance Study* (1992)

Battalio, Bob Physical Processes at Ocean Beach San Francisco (2011)

[http://www.coastalconference.org/h20/pdf/2011-05-25-Wednesday/Session 6B-Coastal Sediment Management/Battalio Coastal Processes at Ocean Beach.pdf](http://www.coastalconference.org/h20/pdf/2011-05-25-Wednesday/Session%206B-Coastal%20Sediment%20Management/Battalio%20Coastal%20Processes%20at%20Ocean%20Beach.pdf)

California Coastal Commission Coastal Development Permit Permit No. PWP 1-79-6 *Lake Merced Transport* (1991)

California Coastal Commission *Initial Summary Report and Staff Recommendations* Application Numbers 137-77 and 128-78 (1978)

Letter from Douglas, Peter, Executive Director, California Coastal Commission (Letter to Coastal Commissioners, Interested Persons, Subject: Status Report on Implementation of Beach Nourishment Plan, Ocean Beach, City and County of San Francisco for the Commission meeting of August 14, 1992)

Statement from O'Neill, Brian Superintendent, Golden Gate National Recreation Area (to the Coastal Commission Hearing) September 10, 1986

City and County of San Francisco *Beach Nourishment Program* (1986) Available online at <http://www.sfdpw.org/Modules/ShowDocument.aspx?documentid=650>

Ecker, R.M. *Ocean Beach Sand Replenishment Program* (1980)

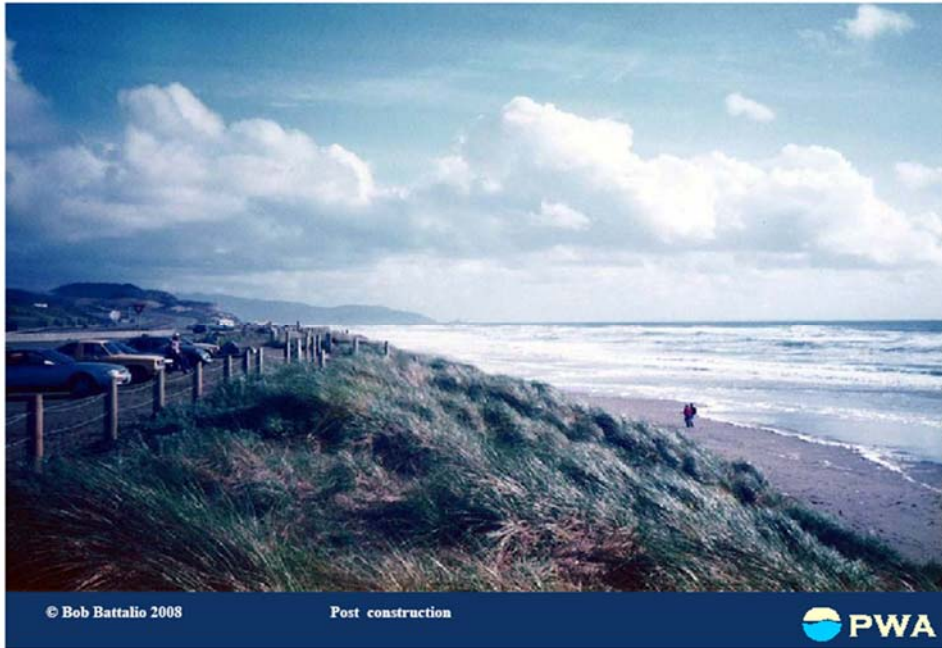
Letter from Fischer, Michael L. Executive Director, California Coastal Commission (Letter to State and Regional Commissioners, Interested Public) June 13, 1979

McLaughlin, Bill A *History of Coastal Erosion at Ocean Beach* (2012)

Olmsted, R.O. *Ocean Beach Study: A survey of Historical Maps and Photographs*. San Francisco: San Francisco Wastewater Management Program (1979)

San Francisco Planning and Urban Research *Ocean Beach Master Plan* (2012) Available at <http://www.spur.org/ocean-beach>

Pictures:



Sloat Parking Lot Looking South – Circa 1993
(Photo: courtesy of Bob Battalio, PWA-ESA and Associates)



Same Area, 1997/1998 El Niño with first emergency rock revetment
(Photo: courtesy of Bob Battalio, PWA-ESA and Associates)



South Sloat Parking Lot: Concrete Fill that has eroded from the artificial bluff top. 2016 Photo: Bill McLaughlin



